



## Teaching and Learning the Geosciences with Virtual Field Trips

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Field experiences are essential to learning about the Earth but cost and accessibility can be barriers to student learning. Virtual Field Trips (VFTs) can provide students opportunities to learn about places and geologic phenomenon they may not be able to study directly. VFTs integrate interactive maps with teacher and student curated materials. These materials include geo-located 360°, panoramic, standard and video imagery from digital, smart phone and 360° cameras. Additionally, text, Internet links, historical images and footage, and recordings can be imported into the map along with original text and documents. While VFTs can be used to teach geoscience content, they can also be created by students to demonstrate mastery of learning objectives. This presentation will show two examples of VFTs, the first is teacher created of the Front Range of Colorado and the second is how VFTs can be created by students to demonstrate understanding of important submarine geologic features that have been important in understand plate tectonics.

In the first VFT, students are introduced to the fundamental indicators of the region's stratigraphy and orogenic history as they interact with a VFT created by their teacher. From the VFT, they generate questions and identify areas that they want to examine more closely. The area has a geologic story that extends to at least 1.7 billion years ago and includes Precambrian metamorphism and igneous intrusions, remnant deposits from a mountain range that disappeared 300 million years ago, sedimentary rocks that recorded Cretaceous sea transgressions and regressions, and the changing ecological systems as told by an incredibly well preserved, and now exposed, fossil assemblage. Students can then participate in a real field trip to the area and work together to collect geoscience data and answer those questions that were generated when interacting with the VFT.

The second example of a VFT, was created by a group of three 14-15 year old students to demonstrate their understanding of submarine geologic features and what those features tell us about plate tectonics and Earth Processes. In this "performance assessment" students create a product in which they construct an explanation for ocean-floor features based on scientific evidence from a variety of sources. Students identify causal relationships between the submarine features that they are learning about and the theory of plate tectonics.

VFT are not a replacement for actual field experiences. However, they may enable teachers and students to experience a place they may never be able to visit. VFT increase accessibility for individuals who are physically disabled, enable teachers working in remote regions to expose their students to places they cannot visit because of limited finances and infrastructural support, and inspire students to explore the our planet and beyond.